# TIP 257: Energy and Cost-Optimized Technology Options to Meet Energy Needs of Northwest Food Processors

## Context

In 2009 the Northwest Food Processors Association (NWFPA) signed a Memorandum of Understanding (MOU) with regional organizations and the U.S. Department of Energy (DOE) to formalize a long-term goal of reducing energy use at their facilities by 25% in ten years. Combined cooling, heating, and electric power (CCHP) Distributed Generation (DG) and energy storage installed onsite at energy-intensive food processing facilities can convey electricity, heat, and cooling power to buildings and industrial processes directly onsite while significantly increasing energy efficiency, security of energy supply, and grid independence.

There is a high concentration of food processing plants near Portland, OR, and Seattle, WA; regions of high power consumption and where it is particularly challenging to wheel in electrical power. NWFPA members have approximately 70 Megawatts-electric (MWe) of electric load in both the Seattle area and Portland. Thus, the power output levels of these plants are high enough to play a role in facilitating non-wires transmission solutions.

NWFPA and its initial partners, Northwest Energy Efficiency Alliance (NEEA) and the U.S. Department of Energy, recognize that the most effective way to manage energy costs, reduce greenhouse gas emissions, and at the same time increase productivity and economic growth is to pursue energy efficiency.

## Description

The proposed work addresses important research areas highlighted in BPA's Northwest Energy Efficiency Technology Roadmap in Heating, Ventilation, and Cooling and BPA Technology Innovation Focus Areas in Transmission and Energy Storage. PNNL's existing EnergyPlus and GridLab-D simulation and modeling capabilities allow for comparison of the economics, environmental impacts, engineering performance, and non-wires solution benefits of combinations of advanced DGs technologies (including micro-turbines, internal combustion engines, and fuel cells) and distributed energy storage (including thermal, electrical, and cooling storage) to the performance of state-of-the-art competing technologies.

Further, unlike hydro and wind, biogas-fueled DG can be dispatched and therefore can be used to help manage fluctuating power needs on the grid. Large decreases in fuel consumption, greenhouse gases, and air pollution emissions can be achieved.

EnergyPlus models will be deployed to identify optimal strategies for designing, installing, and operating combinations of combined heat and power (CHP) and CCHP DG and energy storage at food processing facilities so as to reduce energy consumption and emissions by 25% or more. GridLab-D models will also be deployed to evaluate opportunities that DG and storage located at food processing plants offer to alleviate regional electricity transmission bottlenecks as well as certain power quality issues.

## Why It Matters

This project will provide a detailed evaluation of opportunities for energy savings, emissions reductions, cost savings, and non-wires solutions from the greater use and better design of combinations of CHP and CCHP DG and energy storage at regional food processing facilities.

EnergyPlus and GridLab-D models will also be deployed to identify optimal design and operating strategies for DG and storage for high-impact non-wires solutions that positively impact the management of the BPA grid. These models will be deployed to evaluate opportunities to reduce constraints on the BPA grid by relying on DG and energy storage to quickly ramp up and/or down to quickly absorb or release energy.

## Goals and Objectives

- One major objective of the proposed project is to identify strategies for increasing the industrial energy efficiency and energy cost savings of NWFPA plants through the deployment of novel combinations and designs of variable-output CHP DG, CCHP DG, and energy storage.
- A second major objective is to identify and quantify best non-wires solutions to benefit the management of BPA's grid by leveraging DG and storage at NWFPA plants. These objectives will be pursued through the deployment of EnergyPlus simulations. Simulation models will also be deployed to highlight how BPA's customer utilities can benefit from DG and storage to reduce their load growth and purchase requirements.

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**Project Start Date:** October 1, 2012

**Project End Date:** June 30, 2014

### Reports & References (Optional)

### Links (Optional)

### Participating Organizations

PNNL

### Funding

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| Total Project Cost: | $876,000 |
| BPA Share: | $400,000 |
| External Share: | $476,000 |
| BPA FY2013 Budget: | $320,472 |

### For More Information Contact:

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